

QUASAR ELECTRONICS KIT No. 1085

POWER SUPPLY CONVERTER 12 TO 6/7.5/9 VDC

General Description

This easy to build project will let you power appliances that require different supply voltages from a single 12 V/1 A transformer. It works equally well from the DC supply of your car making it an ideal converter for different applications in the car.

Technical Specifications - Characteristics

Supply voltage: 12 V (AC or DC)
Max. current: 1 A
Output current: 0.8 A max.
Output voltages: 6-7.5-9 VDC

How it Works

The circuit consists of two different stages. The first is the rectifier bridge with its filter capacitor which converts the AC input to DC and smoothes it. Then there is a voltage regulator circuit built around Q1 which is a BD237 NPN power transistor. There are three zener diodes which by means of a switch are connected one at a time to the base of Q1 changing its bias and effectively changing the output voltage. There is a fuse F1 between the rectifier and the voltage regulator to protect the circuit from short circuits.

Construction

First of all let us consider a few basics in building electronic circuits on a printed circuit board. The board is made of a thin insulating material clad with a thin layer of conductive copper that is shaped in such a way as to form the necessary conductors between the various components of the circuit. The use of a properly designed printed circuit board is very desirable as it speeds construction up considerably and reduces the possibility of making errors. QUASAR ELECTRONICS Kit boards also come pre-drilled and with the outline of the components and their identification printed on the component side to make construction easier. To protect the board during storage from oxidation and assure it gets to you in perfect condition the copper is tinned during manufacturing and covered with a special varnish that protects it from getting oxidised and also makes soldering easier. Soldering the components to the board is the only way to build your circuit and from the way you do it depends greatly your success or failure. This work is not very difficult and if you stick to a few rules you should have no problems. The soldering iron that you use must be light and its power should not exceed the 25 Watts. The tip should be fine and must be kept clean at all times. For this purpose come very handy specially made sponges that are kept wet and from time to time you can wipe the hot tip on them to remove all the residues that tend to accumulate on it.

DO NOT file or sandpaper a dirty or worn out tip. If the tip cannot be cleaned, replace it. There are many different types of solder in the market and you should choose a good quality one that contains the necessary flux in its core, to assure a perfect joint every time. DO NOT use soldering flux apart from that which is already included in your solder. Too much flux can cause many problems and is one of the main causes of circuit malfunction. If nevertheless you have to use extra flux, as it is the case when you have to tin copper wires, clean it very thoroughly after you finish your work.

In order to solder a component correctly you should do the following:

- Clean the component leads with a small piece of emery paper.
- Bend them at the correct distance from the component's body and insert the component in its place on the board.
- You may find sometimes a component with heavier gauge leads than usual, that are too thick to enter in the holes of the p.c. board. In this case use a mini drill to enlarge the holes slightly. Do not make the holes too large as this is going to make soldering difficult afterwards.
- Take the hot iron and place its tip on the component lead while holding the end of the solder wire at the point where the lead emerges from the board. The iron tip must touch the lead slightly above the p.c. board.
- When the solder starts to melt and flow, wait till it covers evenly the area around the hole and the flux boils and gets out from underneath the solder. The whole operation should not take more than 5 seconds. Remove the iron and leave the solder to cool naturally without blowing on it or moving the component. If everything was done properly the surface of the joint must have a bright metallic finish and its edges should be smoothly ended on the component lead and the board track. If the solder looks dull, cracked, or has the shape of a blob then you have made a dry joint and you should remove the solder (with a pump, or a solder wick) and redo it.
- Take care not to overheat the tracks as it is very easy to lift them from the board and break them.
- When you are soldering a sensitive component it is good practice to hold the lead from the component side of the board with a pair of long-nose pliers to divert any heat that could possibly damage the component.
- Make sure that you do not use more solder than it is necessary as you are running the risk of short-circuiting adjacent tracks on the board, especially if they are very close together.
- When you finish your work cut off the excess of the component leads and clean the board thoroughly with a suitable solvent to remove all flux residues that may still remain on it.

- The construction of the project is very simple if you follow the diagrams carefully and observe the rules outlined above. First of all solder the fuse holder and the pins in their places on the board, continue with the resistors and the capacitors taking care to insert the electrolytic correctly, and finally solder the diodes observing again their polarity. The transistor can get quite hot during operation and it must be mounted on the heatsink provided. The leads of the transistor must be bent so they can pass through the oval shaped hole of the heatsink when the transistor is mounted on it. To mount the transistor and the heatsink on the p.c. board you should use the screw provided passing it through the hole of the transistor, the small round hole of the heatsink and a similar one on the p.c. board. Use some heat transfer compound and tighten the screw well to ensure a good thermal contact between the transistor and the surface of the heatsink. Solder the transistor carefully and make a thorough inspection of the work done so far. If everything seems to be in order, clean the p.c. board thoroughly and make the following connections:

- At points 1 and 2 connect the (12 V) input voltage.

- Points 8,9,10 to the wiper of a switch having three or four positions depending if you wish to have a 12 V output as well or not.
- Points 5,6,7 (and 0 if you wish to have a 12 V output) should be connected with the different pins of the switch as it is shown in the diagram.
- The output voltage will be taken from points 3 (-) and 4 (+).

If you only want to use one voltage, you may leave the switch out of the circuit and use a jumper between the points 5-8,6-9 or 7-10 for 6, 7.5 and 9 Volts respectively. If you need 12 VDC you can take it from 0 (+) and 3 (-). If the circuit is going to be used in the car only, you can leave the rectifier diodes out of the circuit and connect the power across the capacitor C1

Adjustments

This kit does not need any adjustments, if you follow the building instructions.

Warning

QUASAR ELECTRONICS kits are sold as stand alone training kits.

If they are used as part of a larger assembly and any damage is caused, our company bears no responsibility.

While using electrical parts, handle power supply and equipment with great care, following safety standards as described by international specs and regulations.

If it does not work

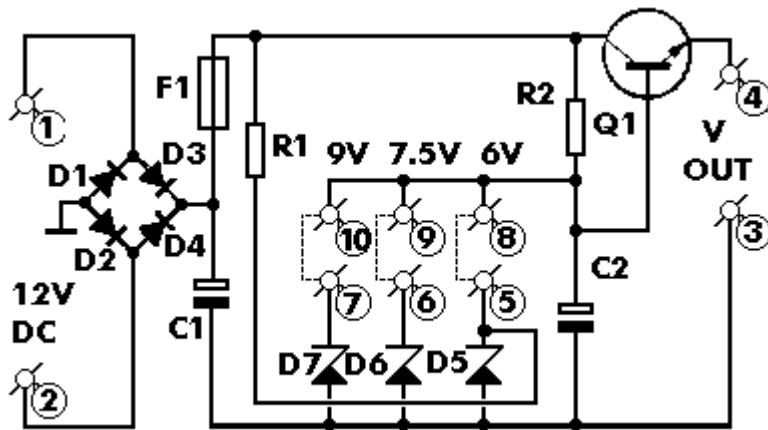
Check your work for possible dry joints, bridges across adjacent tracks or soldering flux residues that usually cause problems.

Check again all the external connections to and from the circuit to see if there is a mistake there.

- See that there are no components missing or inserted in the wrong places.
- Make sure that all the polarised components have been soldered the right way round. - Make sure the supply has the correct voltage and is connected the right way round to your circuit.
- Check your project for faulty or damaged components.

If everything checks out and your project still fails to work, please contact us for information on our Get-You-Going service.

Schematic Diagram



Parts List

All components including printed circuit board, assembly instructions including schematics and detailed parts list are supplied when you purchase the kit.

Ordering

For pricing info and online ordering please visit:

<http://www.quasarelectronics.com/1085.htm>

For further info please contact us by e-mail:

[mailto: sales@QuasarElectronics.com](mailto:sales@QuasarElectronics.com)

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